Translating Words into Equations with One Unknown

This section will focus on how to translate a situation into an equation with one unknown.

Before you continue working through this lesson, be sure that you have mastered the skills from the section, **Translating Words into Algebraic Expressions.**

The equations in this section will only have one unknown variable **x**.

Also, since this is the first lesson on how to write equations, you will always be told what the unknown **x** represents.

For example, in the following sentence:

"Four taken away from the number **x** is ten,"

The unknown is the **number x**.

We remember that an equation has a left side and right side. The symbol that defines the two sides is the equals symbol **=**.

In the above example, the word "**is**" tells us where the equals sign should be placed in the equation.

Four taken away from the number x is **ten**

$$x - 4$$

Now, focus on the right side.

$$10$$

Finally, we can write the equation.

$$x - 4 = 10$$

You can also represent real life situations with equations.

For example, translate the following situation into an equation.

"Let x represent Dan's present age. In eight years, Dan will be thirty years old."

First, we identify Dan's present age.

Dan's present age : **x**

Next, we identify Dan's age in eight years.

Dan's age in eight years : **x + 8**

x + 8 is the left side of the equation

30 is the right side of the equation

The equation that represents the situation is **x + 8 = 30**.

Let's look at one more example that is a little more complicated because of the wording.

Translate the following situation into an equation.

"Let x represent Kim's present age. By taking five years off twice Kim's age we get fifteen years."

First, we identify Kim's present age.

Kim's present age : **x**

Next, we identify

"Taking five years off twice Kim's age."

2x - 5

2x – 5 is the left side of the equation

15 is the right side of the equation

The equation that represents the situation is **2x - 5 = 15**.

We are ready to do more challenging examples.

Example

1. Translate the following statement into an equation.

"The number x increased by 4 is 12."

Step 1: Focus on the left side of equation.

x + 4

Step 2: Focus on the right side of equation.

12

Step 3: Write the equation.

x + 4 = 12

2. Translate the following sentences into an equation.

"Let x represent Karen's present age. Six years ago, **Karen was eleven years old**."

Step 1: Focus on the left side of equation.

x - 6

Step 2: Focus on the right side of equation.

11

Step 3: Write the equation.

x - 6 = 11

3. Translate the following situation into an equation.

"Nancy has $8 more than Jennifer. Together, they have $34. Let x represent Jennifer's money."

Step 1: Identify the algebraic expression that represents the money that each girl has.

Jennifer **x**
Nancy **Nancy has $8 more than Jennifer**

x + 8

Step 2: Write the equation using the following information.

Together, they have $34.

Jennifer's money + Nancy's money = $34

$$(x)+(x+8)=34$$
$$x+x+8=34$$
$$2x+8=34$$

4. Translate the following situation into an equation.

"John is two years older than his sister Sheila. Five years ago, the sum of their ages was 32 years. Let x represent Sheila's present age."

Step 1: Identify the algebraic expression that represents each person's present age.

Sheila **x**
John **John is two years older than his sister Sheila**

x + 2

Step 2: Identify the algebraic expression that represents their ages five years ago.

Sheila **x - 5**

John **x + 2 - 5**

x - 3

Step 3: Write the equation using the following information.

Five years ago, the sum of their ages was 32 years.

$$(x-5)+(x-3)=32$$
$$x-5+x-3=32$$
$$x+x-5-3=32$$
$$2x-8=32$$

5. Translate the following situation into an equation if we let x represent the width of the rectangle.

"The perimeter of a rectangle is equal to 100 units. The length of the rectangle measures 10 units more than twice the width."

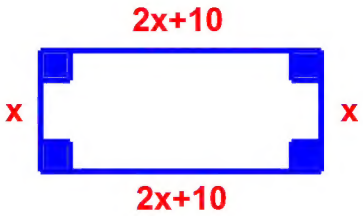
Step 1: Identify the algebraic expressions that represent the length and width of the rectangle.

width **x**

length **The length of the rectangle measures 10 units more than twice the width**

2x + 10

Step 2: Draw the rectangle and label the sides.



Step 3: Add the sides to get the perimeter of the rectangle.

$$P=(x)+(2x+10)+(x)+(2x+10)$$

$$P=x+2x+10+x+2x+10$$

$$P=x+2x+x+2x+10+10$$

$$P=6x+20$$

Step 4: Rewrite the equation with the perimeter (P) equal to 100 units.

$$6x+20=100$$